NUMBERS AND SYMBOLS
- (dash) character, comments, 16
‘ (quote) character, Analysis Services 2005 support, 41
"*" (connection string), AMO.NET management, 297
, (comma) character, 3, 7–9
. (dot) characters, query element separator, 3
/* and */ symbols, comment delimiters, 16
// symbol, comment style, 16
: (colon) character, 7–9
: (colon) operator, 140–142
; (semicolon) character, 366
[ and ] (square bracket) characters, 3
{ and } (curly braces) characters, 3
| | (double pipe) operator, 541
+ (plus) operator, 541
52-week high/low, moving aggregate calculations, 79–81

actions
ADOMD.NET execution, 464–465
COMMANDLINE, 422–423
cube context, 146
definitions, 425–428
described, 419
DrillThrough, 413
dropping, 432
HTML, 420
invocation types, 430
numerical codes, 429–430
OLE DB for OLAP specification element, 411
properties, 430–432
PROPRIETARY, 423
RDBMS connections, 423–424
restriction columns, 428–429
rowset return columns, 430
target scopes, 429
targets, 424–425
types, 419–422, 429
UDM element, 242
URL, 420
uses, 419–424
ActiveX Automation, stored procedure, 286
Add Business Intelligence Wizard, MDX Scripts, 405

A
AASL (Analysis Services Scripting Language), 366–367, 528–530
account types, aggregation behaviors, 498
Add() function, 291–292
AddCalculatedMembers() function, Analysis Services, 9, 542
ADO.NET
  drill-through query access, 416
drill-through results access, 412
ADOMD
  Catalog object, 442
cell property queries, 33
cell updates, 329
Connection.CommitTrans method, 330
MDX supported API, 2
  versus ADOMD.NET object model, 442–443
ADOMD.NET
  action execution methods, 464–465
  AdomdCommand object, 442, 450–451
  AdomdConnection object, 442
  AdomdDataReader class, 466–470
  AdomdSchemaGuid class, 446
  Analysis Services 2005 support, 284
  Cell object, 455–457
cell data retrieval, 460–462
cell ordinal calculation, 460–461
cell property queries, 33
cell retrieval properties, 455–457
CellSet object, 442, 452–457
command execution, 450–451
connection strings, 443–444
CreateCommand method, 450–451
DataReader class, 466
dimensions, 448–449
DRILLTHROUGH statement, 462
drill-through results access, 412
ExecuteReader method, 462–463
  flattened result sets, 465–470
GetSchemaDataSet method, 445–446
KPIs (key performance indicators), 438–439, 463–464
MDX supported API, 2
Member object, 457–460
member property information retrieval, 457–460
metadata caching, 449
metadata object model, 446–449
metadata retrieval methods, 444–449
Microsoft.AnalysisServices.
  AdomClient.dll reference, 443
  parameterized commands, 451–452
  query execution methods, 450–464
  recordset drill-through data retrieval, 462–463
  RefreshMetadata, 449
  results handling, 465–470
  schema rowset retrieval, 445–446
  tabular results queries, 416
task types, 442–443
  versus ADOMD object model, 442–443
ADOMD Server objects
  Context, 293
  Expression, 291
  MDX interaction, 289
  Member, 290
  metadata objects, 294–295
  Set, 290
  SetBuilder class, 292
  supported MDX functions, 292–293
  TupleBuilder class, 291
AdomdCommand object
  ADOMD.NET, 442
  command execution, 450–451
AdomdConnection object,
  ADOMD.NET, 442
AdomdDataReader class, tabular results, 466–470
AdomdSchemaGuid class, schema rowset retrieval, 447
Aggregate, 133–134, 542
aggregate cells, multiple partition drill-through, 415
Aggregate() function, Analysis Services 2005, 138–139
aggregate functions, cell calculations, 336–337
aggregation
  leveraging, 163
  parent/child attribute hierarchies, 387–388
  year-to-date calculations, 76–79
aggregation assignments
cell paths, 373
last pass wins rule, 373
MDX Scripts, 371–376
aggregation functions
Analysis Services 2005, 257–258
nonadditive measures, 390
semi-additive measures, 390
Time dimension, 255–256
.AllMembers function, Analysis Services, 9, 229, 544
allocations
percent contribution calculations, 65–70
proportional, 408–409
proportional calculations, 70–71
unweighted, 71, 409
AllowDrillthrough flag, Analysis Services 2005 deprecation, 413
AllowPartialTrustedCallers property, AMO.NET management, 297
ALTER CUBE statement, dimension member alterations, 324–325
ALTER CUBE CREATE DIMENSION MEMBER statement, 325
ALTER CUBE DROP MEMBER statement, dropping members, 327
ALTER CUBE MOVE DIMENSION MEMBER statement, 326
ALTER CUBE UPDATE DIMENSION MEMBER statement, member update, 327
AMO (Analysis Management Objects), 284, 295–297
AMO object model
action definitions, 425–428
dropping actions, 432
KPI creation, 434–436
AMO.NET management
AllowPartialTrustedCallers property, 297
connection string (“*”), 297
registration requirements, 296–297
stored procedures, 295–297
Analysis Management Objects (AMO), 284, 295–297
Analysis Manager, Analysis Services 2000, 38
analysis models, UDM element, 242
Analysis Services
AddCalculatedMembers() function, 9
.AllMembers function, 9, 229
Ancestor() function, 68
Ascendants() function, 181–182
average calculations, 72–74
Axis() function, 103
balance carryover calculations, 84–88
calculated member support, 37–39
capitalization issues, 6
cell value expressions, 108
Count() function, 50–51, 82–83
database ordering issues, 10
division by zero calculations, 95, 136
empty cell handling, 136–138
Hierarchize() function, 181
intrinsic properties, 31–32
invalid location handling, 140–142
MAX() function, 82–83
member equivalence testing, 225
MIN() function, 82–83
multiplication aggregations, 219–225
named set client surfacing, 59
named set handling, 150
NonEmpty() function, 113–114
NonEmptyCrossJoin() function, 113–114
null members, 18
NULL operator, 137–139
query scope support, 39
recursive calculated members, 218–219
session scope support, 39
solve order, 44, 45
Stddev() function, 54
StddevP() function, 54
StrToValue() function, 222
SUM() function, 82–83
tied rank handling, 168–169
Variance() function, 54–55
VarianceP() function, 55
VisualTotals() function, 197–199
weighted averages, 73–74
wrong-level reference calculations, 94–95
Analysis Services 2000
Analysis Manager, 38
axes limits, 21
calculated cells support, 365
calculated members, 39
calculation rules, 144–145
client architecture, 472–473
COM DLL support, 286
COM stored procedure support, 305–306
custom rollup formulas, 341
Descendants() function argument, 183
dynamic security, 303
invalid location handling, 141–142
.Members operator aspects, 11
most recent event returns, 212–213
named set scopes, 58–60
NON_EMPTY_BEHAVIOR property, 111
NonEmptyCrossJoin(), 74
parent-child dimensions, 253
pass order, 376
PTS (PivotTable Services), 472
.set alias references, 155–156
solve order, 99, 135
tied rank handling, 168
TopCount() function, 164–165
UDFs (user-defined functions), 56, 283
.unique names, 185
VisualTotals() function, 197–198

Analysis Services 2005
action types, 419–422
ADMOD.NET support, 284
Aggregate() function, 133–134
aggregate functions, 336–337
aggregation functions, 257–258
AMO (Analysis Management Objects), 284
.attribute hierarchy, 491–492
.attribute relations, 123–125
attribute-relationship model, 244–247
autoexists, 118–119
axes limits, 21
BI Development Studio, 38
Binary XML support, 472
Business Intelligence Development Studio, 244
calculated cells support, 365
calculation definitions, 146–148
calculation model, 266–267
calculation passes, 99
calculation rules, 144–145
.CELL PROPERTIES statement, 467–468
cells, 256–266
.CurrentIndex function, 177
custom rollup formulas, 341
data value subcubes, 127
database dimension, 249–251
data-mining model support, 263
Define Time Intelligence Wizard, 227
dimension attributes, 244–247
dimension browsing methods, 245, 247–248
dimension queries, 249–251
dimension root, 382
Dimension Wizard, 245
dimensions, 242–256
DrillThrough action, 413–415
drill-through operations, 266, 413
.DROP SUBCUBE statement, 119, 128
dynamic security, 303–305
dynamic sorts, 205
Error() function, 300, 302
fact table data support, 256
.HAVING clause resolution, 111–114
hierarchies, 247
IgnoreUnrelatedDimension property, 261–262
.kpi MDX expression framework, 411–412
Invalid function aggregation, 84
.leaves, 382
.local cube creation, 501–502
-many-to-many relationship, 263
measure expression, 487
MeasureGroupMeasures() function, 257–258
member interdependence, 121–124
member properties, 252
member property calculations, 89–92
MemberValue() function, 483
MOLAP (multi-dimensional OLAP) cache, 240
most recent event returns, 212–213
multidimensional sorts, 205
.NET Assemblies support, 286
.NET CLR (common language run-time) assemblies, 283
NON_EMPTY_BEHAVIOR property, 111, 491
NonEmpty() function, 73–74, 476, 478–479
NULL keyword, 79
OLAP Mining Models, 263
parameterized commands, 451–452
parent-child hierarchies, 253–255
pass order issues, 376
perspectives, 265
Proactive caching, 240
product-specific solve order, 132–134
PTS (PivotTable Services), 472
query execution stages, 99–107
quote (') character, 41
Rank() function, 165
relationships, 249
Return clause, 414–415
role-playing dimensions, 264
Roles editor, 267–268
RTM version bug, 377, 388
running totals, 77–78
scope calculation controls, 80
Scope() function, 492–494
security definitions, 267–271
SELECT statement, 128–131
semi-additive measure support, 82
set alias references, 155
single set/multiple criteria sorts, 202
slicer set support, 102
snowflake schema dimension, 242–243
solve order, 99
star schema dimension, 242–243
stored procedures, 56
strong hierarchies, 116–117
subcube restrictions, 123–125
subcube scope, 150
subcube specifications, 125–126
subcubes, 199–200
supported function libraries, 283–285
tied rank handling, 169
Time dimension, 255–256
Time Intelligence Wizard, 408
TopCount() function, 164–165
tuple query syntax, 20
TYPED flag, 184
UDM (Unified Dimensional Model), 240–242
unique names, 185
UnOrder() function, 480
VBA function support, 284
VisualTotals() function, 198–199
Weight rollup operator, 338
XMLA support, 472–473
Analysis Services Scripting Language (AASL), 366–367, 528–530
analytics, UDM element, 242
Ancestor() function
Essbase, 181–182, 544
percent contribution calculations, 67–69
sorts, 161
ancestors, parent/children arrangements, 181–183
APIs (application programming interfaces), 2
arithmetic operators, 48
arrays, COM stored procedure value passing, 307–311
Ascendants() function, Analysis Services, 181–182, 546
assembly collections, stored procedures, 316
asterisk (*) symbol, comments, 16
attribute hierarchies
dimension browsing method, 245
MDX Scripts, 379–386
Versus member property, 491–492
Attribute() function, member selections, 276–278, 546
AttributeHierarchyEnabled attribute, disabling, 253
attribute-relationship model, Analysis Services 2005, 244–247
attributes
AttributeHierarchyEnabled, 253
base dimension member selections, 276–280
calculations, 275–276
dimension element, 244–247
IN operator connections, 280–281
IsEmpty() function, 276
MDX Script hierarchies, 379–388
parent/child hierarchies, 387–388
reasons for disabling, 253
relationship establishment, 249
retrieval query, 274–275
Time dimension, 256
versus UDAs (user-defined attributes), 273–274
autoexist
Analysis Services 2005, 118–119
behavior query, 250
AverageOfChildren function, semi-additive measures, 390
averages
calculation methods, 71–74
percent contribution calculations, 65–70
year-to-date aggregation calculations, 76–79
Avg() function
simple averages, 72, 546
summary statistical operator, 50
year-to-date aggregation calculations, 76–78
axes
attribute/UDA retrieval, 274–275
axis 0 result rowset, 467
calculated member definitions, 187–190
cell context when resolving, 104–106
described, 3
name/numbering framework, 5–6
NON EMPTY keyword, 15–16
non empty resolution, 110–111
non-axis 0 result rowsets, 468–470
query evaluation stage, 103–106
query reference, 3
Axes class, named axes, 454–455
axis() function
axes resolution, 112, 546
calculated member definitions, 187–190
query evaluation stage, 103
axis-only queries, when to use, 22
B
BACK_COLOR property, cell calculations, 351
BACK_COLOR() statement, subcube
property value assignments, 402
balance carryover, 84–88
basic operators, 538–541
BI Development Studio, Analysis Services 2005, 38
binary wire-protocol connection, ADOMD.NET, 444
Binary XML, Analysis Services 2005 support, 472
Boolean expression, NULL operator treatment, 138
BottomCount() function, 166, 477, 548
BottomPct() function, 477, 548
BottomPercent() function, percent retrieval, 174, 548
BottomSum() function, tuple thresholds, 172–173, 548
boundary conditions, calculation methods, 92–95
Business Intelligence Development Studio
Analysis Services 2005, 244
dimension browsing, 248
parent-child hierarchy browsing 255
ByAccount function, hierarchy measure value aggregation, 257
C
C# language
action definitions, 425–428
ADOMD.NET reference, 443
cells-scoped action, 422–424
drill-through execution, 416–417
KPI creation, 435–436
ADOMD.NET metadata, 449
MOLAP (multi-dimensional OLAP), 240
Proactive caching, 240
CALCULATE command, 336–337, 549
Calculate() function, MDX expression evaluation, 291
CALCULATE statement, MDX Scripts, 366–368
calculated cells. See also MDX Scripts
Analysis Services 2000 support, 365
Analysis Services 2005 support, 365
pass order, 376
versus MDX Scripts, 365
calculated measures
proportional allocations, 408–409
unweighted allocations, 409
calculated members. See also members
calculation mechanism, 341–345
CREATE MEMBER command, 45–47
CREATE MEMBER statement, 341, 342–345
DDL (data definition language) form, 37
definitions, 342–345
dimensional calculations, 38–39
DROP MEMBER command, 341
dropping, 345
global scope, 39
MDX Script value assignments, 376–377
NON_EMPTY_BEHAVIOR property, 111
non-aggregated calculations, 360
query scope, 39
ratio definitions, 187–190
recursive evaluation, 108–110
scope, 39–48
session scope, 39
solve order, 42–48, 99
WITH keyword queries, 39–42
CalculateMdxObject() function, MDX expression evaluation, 291
calculation model, Analysis Services 2005, 266–267
CalculationPassValue function, equation solving, 357–358, 549
calculations
aggregation mixing, 82–83
aggregation-related, 497–498
attributes, 275–276
averages, 71–74
backward forward time sums, 216–219
balance carryover, 84–88
boundary conditions, 92–95
calculated members, 38–39, 341–345
cell calculation mechanism, 346–351
cell calculations, 353–358
cell ordinal, 460–461
cell property precedence, 143–146
custom member formula, 339–341
custom member formulas on multiple dimensions, 352
database design, 482–483
date arithmetic, 183–186
dates, 183–186
division by zero, 69–70, 95
equation solving, 356–358
52-week high/low, 79–81
financial modeling, 356–358
flow-type, 495–497
formula solve order, 358–360
function listing, 63–64
generic axis, 187
insufficient hierarchical depth, 93–94
insufficient range size, 93
interaction methods, 351–362
intrinsic aggregation, 360–362
intrinsic aggregation for a measure, 336–337
last entered balance, 88–89
leaf-level, avoiding, 485–487
leaf-level optimization methods, 487–491
MDX Script, 484–485
member properties, 89–92
metadata referencing functions, 64–65
moving aggregate, 79–81
multiplication aggregations, 219–225
NON_EMPTY_BEHAVIOR property, 491
non-aggregated calculated members, 360
calculations (continued)
NonEmpty() function, 490–491
NULL operator handling, 139–140
percent contribution, 65–70
percentage-of-total contributions, 191–196
period-to-period references, 75–76
proportional allocations, 70–71
query error handling, 136
rolling averages, 79–81
rollup by unary operator, 338–339
same-period-last year references, 76
share-of-parent, 67
share-to-parent, 93–94
solve order, 358–360
target member time range selections, 81
time-based references, 74–81
time-series, 74–81
top-down solve order, 108
UDAs (user-defined attributes), 275–276
unary operator precedence on multiple dimensions, 352
weighted averages, 73–74
wrong-level reference, 94–95
year-to-date aggregations, 76–79
calendars, date calculations, 183–186
Call statement, 296, 320
capitalization, non-case sensitive, 6
Caption() function, Return clause support, 415
carryover balance, 84–88
Catalog object, ADOMD, 442
CDate function, date calculations, 184
cell calculations
calculation mechanism, 346–351
conditional formatting, 351
CREATE CELL CALCULATION statement, 346–350
definitions, 346–350
dimension expressions, 347–348
dropping, 350–351
equation solving, 356–358
financial modeling, 356–358
infinite recursion, 358
passes, 353–358
query-specific, 346
SOLVE_ORDER property, 347
cell formatting, display precedence, 143–144
Cell object, retrieved cell property storage, 455–457
cell ordinal, cell data retrieval method, 460–461
cell properties, 668–673
CELL PROPERTIES keyword, cell property queries, 33
CELL PROPERTIES statement, flattened result sets, 467–468
cells
ADOMD.NET data retrieval, 460–462
calculated data types, 144–146
calculated member solver order, 42–48
calculation methods, 335–336
Cell object, 455–457
current cell referencing, 107
data refresh, 328
data updates, 323
display formatting precedence, 143–144
drill-through operations, 266
drill-through query requirements, 414
drill-through security, 418
empty handling, 136–138
evaluation queries, 107–111
intrinsic aggregation for a measure calculation method, 336–337
last pass wins rule, 373
multiple aggregation paths, 373
multiple partition drill-through, 415
non empty resolution, 110–111
property calculation precedence, 143–146
property queries, 32–33
property value assignments, 402–404
query execution stages, 99–107
retrieval properties, 455–457
security application, 270
selection query, 2
tuple function returns, 19
UPDATE CUBE statement, 330–334
CellSet object, ADOMD.NET, 442, 452–457
ChildCount flag, member information retrieval, 460
Children function, member returns, 10–11, 551
classes
  AdomdConnection, 444
  AdomdRestrictionCollection, 445
  AdomdDataReader, 466–470
  AdomdSchemaGuid, 446
  Axes, 454–455
  Cell, 455
  Cellset, 450
  DataReader, 466
  Kpi, 438–439
  OlapInfo, 452–453
  OlapInfoProperties, 453
  SetBuilder, 292
  TupleBuilder, 291
clauses, DIMENSION PROPERTIES, 30–31
clients
  AS2000 versus AS2005 architecture, 472–473
  CREATE MEMBER command, 44–47
drill-through, 412–418
named sets surfacing, 59
results data layout conventions, 34
ClosingPeriod function, 551
balance carryover calculations, 87–88
time/non-time calculations, 83, 551
CoalesceEmpty() function, Essbase, 165, 551
code, readability enhancements, 7
colon (:) character, set constructor, 7–9
colon (:) operator, invalid location handling, 140–142
column placeholders, INSERT INTO statement, 517
columns
  action restrictions, 428–429
  axis 0 result rowset, 467
calculated member definitions, 187–190
drill-through query returns, 414–415
non empty resolution, 110–111
non-axis 0 result rowsets, 468–470
query dimension specifications, 3
tuples query display, 18–19
COM (Component Object Model),
  Analysis Services 2005 support, 283
COM DLL, stored procedures, 286, 305–306
COM stored procedures
  array value passing, 307–311
  MDX functions, 312–314
  number/string returns, 306–307
  security concerns, 305–306
comma (,) character
  query element separator, 3
  set constructor, 7–9
COMMANDLINE action, cell drill-through, 422–423
commands
  ADOMD.NET execution, 450–451
  AdomdCommand object, 442
  ALTER CUBE, 355
  CALCULATE, 336–337
  CREATE CELL CALCULATION, 346–350
  CREATE CUBE statement, 512–513
  CREATE MEMBER, 44–47
  CREATE SET, 58–59
  CREATE SUBCUBE, 120
  DROP CELL CALCULATION, 350–351
  DROP MEMBER, 341
  DROP SET, 58–59
  DROP SUBCUBE, 120
  parameterized, 451–452
  USE LIBRARY, 316
comment delimiters, /* and */ characters, 16
  comment extension, // symbol, 16
  comments, documentation facilitation uses, 16–17
  nesting, 17
COMMENTS property, Essbase, 31
comparisons, NULL operator handling, 139–140
complex cubes, multiple attribute hierarchies, 379–386
Component Object Model (COM),
  Analysis Services 2005, 283
conditional assignments, MDX Scripts, 404–405
conditional formatting, cell calculations, 351
connection parameters, 637–659
connection string (“*”), AMO.NET management, 297
connection strings, ADOMD.NET, 443–444
Connection.CommitTrans method, data updates, 330
context
looping queries, 114–116
named sets, 149–150
query execution element, 101
slicer override, 106–107
Context, ADOMD Server objects, 293
.Count, summary statistical operator, 50–51, 553
COUNT function
Analysis Services, 82–83, 180, 553
semi-additive measures, 390
summary statistical operator, 50–51
Cousin(), moving aggregate calculations, 79–80, 553
CREATE CELL CALCULATION statement, cell calculation definition, 346–350
CREATE CUBE statement
commands, 512–513
dimension definitions, 504–511
framework elements, 503–504
levels, 505–508
measure definitions, 511–512
member properties, 508–510
named hierarchies, 505
overall dimensions, 504–505
ROLAP versus MOLAP, 513–514
CREATE GLOBAL CUBE statement
bugs/quirks, 527–528
dimension definitions, 525–526
level definitions, 526–527
measure definitions, 525
slice members, 527
CREATE MEMBER command, calculated members, 44–47, 341–345
CREATE SET command, 58–59
CREATE SET statement, 150
CREATE SUBCUBE statement, Analysis Services 2005, 119–128
CreateCommand method,
ADOMD.NET, 450–451
CreateCube property, 521
CrossJoin() function
and autoexists, 116
cross-joined sets, 476–477
set combination, 23–25, 555
cross-joined sets
filter operation optimization methods, 475–477
sum operation optimization methods, 474–475
cube targets, INSERT INTO statement, 515–517
cubes. See also local cubes
action targets, 424–425
active MDX Script tag, 366
AdomdConnection object, 442
AllowDrillthrough flag, 413
CALCULATE statement, 367–368
data cell updates, 323
data writebacks, 329–334
described, 256
dimension relationships, 260–264
drill-through, 266, 418
elements, 256
leaf-level calculation, 486–487
OLAP Mining Models, 263
perspectives, 265
role-playing dimensions, 264
curly braces { and } characters, MDX elements, 3
currency formats, LANGUAGE property, 343
CURRENTCUBE identifier
calculated members, 374, 535
named secs, 58
.CurrentIndex function, set reversal, 177
.CurrentMember function
context looping, 114–116, 556
metadata referencing, 65
percent contribution calculations, 66–67, 556
custom member formulas
calculation mechanism, 339–341
MDX Scripts, 393–395
multiple dimension interaction, 352
custom members, pass order, 376
CustomRollup() function, Return clause support, 415
CustomRollupProperties() function, Return clause support, 415

D
dash (-) character, comments, 16
data definition language (DDL), calculated members, 37
Data Description Language (DDL), MDX element, 323
data grids, MDX query structure, 2
data layouts, client result conventions, 34
Data Manipulation Language (DML), MDX element, 323
data navigation, UDM element, 240
data types
  calculated cells, 144–146
datestamp retrieval, 184
  .NET stored procedures, 288
  OLE DB, 344
data values, subcubes, 127
database ordering, Analysis Services versus Essbase, 10
data-driven security, stored procedures, 303
DataReader class, ADOMD.NET, 466
DataSource property, local cubes, 521
date arithmetic, calculations, 183–186
date values, formatting, 679–681
DateAdd() function, future date calculation, 186
DateDiff() function, date calculations, 183–186
dates, calculations, 183–186
DDL (data definition language), calculated members, 37
DDL (Data Description Language), MDX element, 323
debugging, .NET stored procedures, 299
  .DefaultMember function, query execution, 100–101, 557
<DefaultScript> tag, MDX Scripts, 366
Define Time Intelligence Wizard, Analysis Services 2005, 227
definitions, member update, 327–328
Descendants() function
  Analysis Services 2000 argument, 183, 558
  Essbase, 11–14, 558
member descendant retrieval, 181–182
parent/children arrangements, 181
sorts, 161
time/non-time calculations, 82–83
unweighted allocations, 71
descendants, parent/children arrangements, 181–183
dimension expressions, cell calculations, 347–348
dimension levels, INSERT INTO statement, 515–516
DIMENSION PROPERTIES keyword, member property queries, 30–32
DIMENSION PROPERTIES statement, UDA/attribute retrieval, 274–275
Dimension Wizard, Analysis Services 2005, 245
Dimension.CurrentMember, moving aggregate calculations, 80, 556
Dimension.DefaultMember function, session alteration, 324, 557
dimensional calculations, calculated members, 38–39
dimensions
  ADOMD.NET restrictions, 448–449
  attribute hierarchies, 245
  attribute-relationship model, 244–247
  attributes, 244–247
  base member selections, 276–280
  browsing methods, 245, 247–248
  CREATE CUBE statement definitions, 504–511
  CREATE GLOBAL CUBE statement, 525–526
cube element, 256
curly braces { and } characters, 3
data restrictions, 267–271
data-mining relationships, 263
drill-through query issues, 414
dimensions (continued)
drill-through security, 418
drop members, 327, 341, 345
drop set, 58–59
elements, 242–243
fact, 390
granularity attribute, 382
hierarchies, 247–248
hierarchy browsing methods, 245, 247–248
INSERT INTO statement levels, 515–516
leaves, 382
levels, 247–248, 505–508
many-to-many relationship, 263, 388–389
measure group relationships, 260–264
member alterations, 324–325
member definition update, 327–328
member properties, 508–510
member refresh, 328
.Members operator issues, 11
moving members within, 326
multilevel hierarchies, 245
multiple layer sorts, 202–207
named hierarchies, 505
natural versus unnatural hierarchies, 247–248
nested sorts, 203–207
new member creation, 325–326
parent-child hierarchy, 253–255, 516
query methods, 249–251
query specifications, 3
reference, 390
reference dimension relationship, 262–263
relationships, 249, 260–264
role-playing, 264
root definition, 382
security verification, 268–270
snowflake schema support, 242–243
star schema support, 242–243
time analysis, 227–228
Time dimension, 255–256
writebacks, 325–328
DistinctCount() function, summary
  statistical operator, 51
division by zero
calculations, 69–70, 95
query error handling, 136
DML (Data Manipulation Language),
  MDX element, 323
dot (.) characters, query element
  separator, 3
double pipe (||) operator, unsupported, 541
DrillDownLevelBottom() function,
  number ranking, 169–170, 565
DrillDownLevelTop() functions,
  number ranking, 169–170, 566
DrillDownMember() function,
  parent/children arrangements, 181, 567
DrillDownMemberBottom() function,
  number ranking, 169–170, 569
DrillDownMemberTop() function,
  number ranking, 169–170, 569
DrilledDown flag, member
  information retrieval, 460
DrillThrough action, Analysis
  Services 2005, 413–415
DRILLTHROUGH statement
  MDX execution, 417–418
  recordset data retrieval, 462
drill-through
  AllowDrillthrough flag
    deprecation, 413
  Analysis Services 2005 enhancements, 413
cube element, 266
DrillThrough action, 413–415
DRILLTHROUGH statement, 417–418
partitions, 415
recordset data retrieval, 462–463
rowset returns, 415–417
security, 418
DrillThroughFilter property,
  Analysis Services 2005 nonsupport, 413
DrillThroughForm property, Analysis
  Services 2005 nonsupport, 413
DrillThroughJoin property, Analysis Services 2005 nonsupport, 413
DROP CELL CALCULATION, 350–351
DROP MEMBER command, 341
DROP MEMBER statement, 345
DROP SET command, named sets, 58–59
DROP SUBCUBE statement, Analysis Services 2005, 119, 128
dynamic security, stored procedures, 303–305

E
equation solving, cell calculations, 356–358
error values, subcube assignments, 402
ERROR() function, subcube error value assignments, 402, 572
Error() function, Analysis Services 2005, 302
Essbase
Ancestors() function, 68, 181–182
attributes versus UDAs (user-defined attributes), 273–274
average calculations, 72–74
Avg() function, 50
axes limits, 21
balance carryover calculations, 84–88
built-in numeric calculation functions, 56
calculated member support 37
capitalization issues, 6
cell value expressions, 108
CoalesceEmpty() function, 165
Count() function, 50–51
CREATE MEMBER command issues, 45
database ordering issues, 10
Descendants() function, 11–14
DIMENSION PROPERTIES clause support, 31
dimension tip member, 78
division by zero calculations, 95
Hierarchize() function, 181
IN operator, 280–281
intrinsic properties, 31
invalid location handling, 141
IsValid() function, 85, 142
level argument function references, 14
Median() function nonsupport, 52–53
member alias, 158
member equivalence testing, 225
member property value referencing, 275
member selections, 276–280
.Members operator aspects, 11
MISSING operator, 139–140
missing value sort inclusion, 165
most recent event returns, 213, 215–216
multiplication aggregations, 219–225
named set handling conventions, 59
named set session limits, 150
NonEmptyCount() function, 113–114
Null operator, 137–140
Ordinal() function, 221
predefined attributes, 275
query execution stages, 99–107
query scope support, 39
recursive calculated members, 218–219
set alias references, 155
single set/multiple criteria sorts, 202
slicer set support, 102
solve order, 44, 45, 47, 99, 134–135
span of days calculation, 186
statistical aggregation functions, 55–56
Stdev() function nonsupport, 54
substitution variables, 59
tuple aliases, 149
UDA/attribute retrieval, 274–275
Var() function nonsupport, 54–55
weighted averages, 73–74
wrong-level reference calculations, 94–95
events, most recent returns, 212–216
exceptions, stored procedure execution errors, 301–302
exchange rates, displaying/browsing, 257
Execute method, ADOMD.NET command execution, 451
ExecuteCellSet method, ADOMD.NET command execution, 451
ExecuteNonQuery method, ADOMD.NET command execution, 451
ExecuteReader method
ADOMD.NET command execution, 451
execute-through data retrieval, 462–463
ExecuteXMLReader method,
ADOMD.NET command execution, 451
Exists() function, filtering operations, 259, 573
Expression, ADOMD Server objects, 291
expressions. See also MDX expressions
data-driven security, 303
dimension data restrictions, 267–268
MDX Scripts assignments, 398–402
ExpressionSample() function,
extension evaluation, 291, 575
external functions. See stored procedures
ExternalAccess permission, stored procedures, 317

F
fact data, described, 256
fact dimensions, MDX Scripts, 390
fact tables, cube element, 256–257
Filter() function
axes resolution, 104–106, 111–114, 575
cross-joined sets, 475–477
multiple dimensions, 218
named sets, 151–152
set aliases, 153–154
set reductions, 25–27
financial modeling, cell calculations, 356–358
FirstChild() function, semi-additive measures, 390, 575
FirstNonEmpty() function, semi-additive measures, 390
flags
AllowDrillthrough, 413
ChildCount, 460
Descendants() function, 11–14
DrilledDown, 460
ParentSameAsPrev, 460
VISIBLE, 343
flattened result sets, ADOMD.NET, 465–470

F
FONT_FLAGS() statement, subcube property value assignments, 402
FONT_NAME() statement, subcube property value assignments, 402
FONT_SIZE() statement, subcube property value assignments, 402
Font, monospace for readability, 7
FORE_COLOR property, cell calculations, 351
FORE_COLOR() statement, subcube property value assignments, 402
foreign language translation storage, UDM element, 242
FORMAT_STRING property, currency formats, 343
FORMAT_STRING() statement, 402
formatting
date values, 679–681
numeric values, 675–678
string values, 682–684
formula precedence (solve order),
calculated members, 42–48
formulas
calculated member solve order, 42–48
custom member, 339–341
local cube, 522–524
solve order determination, 358–360
FREEZE() statement, subcube assignments, 400–401
FROM clause, SELECT statement inclusion, 128–131
FROM keyword, MDX queries, 3–4
function index, 531–538
function reference, 542–635
functions. See also operators
Add(), 291–292
AddCalculatedMembers(), 9, 542
Aggregate(), 133–134, 542
.AllMembers, 9, 229, 544
Ancestor(), 67–69, 161, 544
Ancestors(), 181–182, 544
Ascendants(), 181–182, 546
Attribute(), 276–278, 546
AverageOfChildren(), 390
Avg(), 50, 72, 76–78, 546
Axis(), 103, 112, 187–190, 546
BottomCount(), 166, 477, 548
BottomPct(), 477, 548
BottomPercent(), 174, 548
BottomSum(), 172–173, 548
ByAccount(), 257
Calculate(), 291, 549
CalculateMdxObject(), 291
CalculationCurrentPass(), 376, 549
CalculationPassValue, 357–358, 549
Caption(), 415
CDate(), 184
.Children, 10–11, 551
ClosingPeriod(), 83, 87–88, 551
CoalesceEmpty(), 165, 551
constructing sets, 540–541
.Count, 50–51, 553
Count(), 50–51, 82–83, 180, 390
Cousin(), 79–80, 553
CrossJoin(), 23–25, 476–477, 555
.CurrentIndex, 177
.CurrentMember, 65–67, 556
CustomRollup(), 415
CustomRollupProperties(), 415
DateAdd(), 186
DateDiff(), 183–186
.DefaultMember, 100–101, 557
Dimension.CurrentMember, 79, 556
Dimension.DefaultMember(), 324, 557
DistinctCount(), 51, 390, 564
DrillDownLevelBottom(), 169–170, 565
DrillDownLevelTop(), 169–170, 566
DrillDownMember(), 181, 567
DrillDownMemberBottom(), 169–170, 569
DrillDownMemberTop(), 169–170, 569
Error(), 300, 302, 402, 572
Exists(), 259, 573
ExpressionSample(), 291
FirstChild(), 390, 575
FirstNonEmpty, 390
function index, 531
Head(), 208, 577
Hierarchize(), 175–176, 181, 578
iif(), 93, 142, 579
Intersect(), 279, 580
IRowssetUpdate:Update(), 330
IsAncestor(), 222, 582
IsEmpty(), 216, 276, 582
IsUDA(), 276, 585
IsValid(), 85, 142, 585
Item(), 86, 585
KEY(), 415
KPIs, 436–437, 587
.Lag(), 79, 85–86, 588
.LastChild, 87–88, 588
LastChild(), 390, 588
LastNonEmpty(), 84, 390, 589
LastPeriods(), 79–81, 85–86, 590
.Lead(), 79, 590
Leaves(), 125, 382, 410, 590
LinkMember(), 185, 264, 591
LOOKUPCUBE(), 495, 594
Max(), 52, 82–83, 114–115, 390, 595
MeasureGroupMeasures(), 257–258, 595
Median(), 52–53, 595
member level testing, 222–224, 595
member.MemberValue, 89–92, 596
member.Properties(), 89–92, 596
MemberRange(), 10, 596
Members(), 313–314, 597
MemberValue(), 415, 482–483, 597
metadata referencing, 64–65
Min(), 53, 82–83, 390, 597
Name(), 415, 598
.NextMember, 75–76, 599
NextMember(), 79, 599
None(), 390
NonEmptyCount(), 53, 600
NonEmptyCrossJoin(), 74, 113–114, 215, 476, 600
functions (continued)
onAxis(), 290
OpeningPeriod(), 83, 601
Ordinal(), 180, 221, 601
ParallelPeriod(), 76, 79–80, 161
percent contribution calculations, 65–70
PeriodsToDate(), 77–78, 608
.PrevMember, 75–76, 609
PrevMember(), 79, 609
Product(), 219
Properties(), 161, 609
Rank(), 165–169, 208, 225–226, 611
RollupChildren(), 339, 613
Root(), 382, 408–409, 613
Scope(), 492–494, 615
semi-additive measures, 255–256
SetToArray(), 307–311, 615
SetToStr(), 312, 615
static versus nonstatic, 297–306
statistical aggregation, 55–56
Stddev(), Stddev(), 54, 617
StddevP(), StddevP(), 54, 617
Storeproc(), 495
STRTOMEMBER(), 495
StrToSet(), 313–314, 616
StrToTuple(), 313–314, 619
STRTOTUPLE(), 495, 619
StrToValue(), 222, 619
Sum(), 52, 76–78, 82–83, 114–115, 474, 620
Tail(), 85, 180, 213–214, 620
THIS(), 395–397, 620
TopCount(), 162–165, 211–212, 477, 621
TopPct(), 477, 622
TopPercent(), 174, 622
TopSum(), 172–173, 217, 623
ToSet(), 292
ToTuple, 291
tuple construction, 540, 624
tuple returns, 18–19, 624
tuple sorting, 161–162, 624
TupleToStr(), 312, 625
UDA(), 279–280, 625
UnaryOperator(), 415, 625
Union(), 181–182, 279, 626
UniqueName(), 415, 626
UnOrder(), 480, 627
Username(), 270, 628
VAL(), 495, 628
ValidMeasure(), 261, 629
Var(), Variance(), 54–55, 629
VarP(), VarianceP(), 55, 629
VisualTotals(), 197–199, 629
WithAttr(), 278–279, 630
YTD(), 167, 635

G
GEN_NUMBER property, Essbase, 31
Generate() function, 576
cross-joined sets, 476
dimension order, 176
hierarchical sorts, 200–201
most recent event returns, 212–216
nested dimension sorts, 204–206
number ranking, 170–171
percent retrieval, 174–175
percentage-of-total calculations, 192–196
tuple to set operation conversion, 182–183
GetSchemaDataSet method
action execution, 464–465
schema rowset retrieval, 445–446
global queries
Analysis Services 2005 solve order, 132–134
calculation definitions, 146–148
global scope, calculated members, 39
granularity attributes, dimensions, 382
GUIDs, schema rowset retrieval, 445–446

H
HAVING clause, Analysis Services 2005, 111–114
Head() function, child tuple reference, 208
heterogeneous data access, UDM element, 240
hierarchical relationships, level skipping sorts, 200–201
hierarchies
ADOMD Server object support, 290, 578
attribute, 379–386
ByAccount() aggregation function, 257
dimension browsing method, 245, 247–248
member properties, 252
natural versus unnatural, 247–248
parent-child, 253–255
parent/child attribute, 387–388
parent/children arrangements, 181–183
Time dimension, 255–256
user, 386–387
Hierarchize() function
dimension order, 175–176
POST flag, 181
HTML action, uses, 420
Hyperion ADM API, MDX support, 2
Hyperion Essbase C, MDX supported API, 2
Hyperion Solutions, MDX support, 441–442

I
ID property, Analysis Services, 31
IF statement
conditional assignments, 404–405
versus IIF() function, 405
IgnoreUnrelatedDimension property, measure groups, 261–262
iif() function
insufficient range size calculations, 93, 579
member existence testing, 142
versus IF statement, 405
IIF() statement, versus Scope() function, 492–494
Impersonation property, stored procedures, 317–318
IN operator, base member connections, 280–281
indents, code readability, 6
infinite recursion, calculation context issues, 131–132
INSERT INTO statement, local cubes, 514–518
InsertInto property, local cubes, 521
insufficient hierarchical depth, calculations, 93–94
insufficient range size, calculations, 93
Intersect() function, member selections, 279, 580
intrinsic aggregation for a measure, calculation mechanism, 336–337
intrinsic aggregation, calculation interactions, 360–362
intrinsic properties
Analysis Services, 31–32
Essbase, 31
IRowsetUpdate:Update function, data updates, 330
IS NULL member, carryover balances, 84–88
IS_EXPENSE property, Essbase, 31
IsAncestor() function, member level testing, 222, 582
IsEmpty() function
attribute value testing, 276, 582
member events, 216
IsUDA() function, UDA value testing, 276, 585
IsValid() function, Essbase, 85, 142
Item() function, balance carryover calculations, 86, 585

J
Java APIs, MDX support, 2
joins, subset concatenation, 9

K
KEY property, Analysis Services, 31
key performance indicators (KPIs)
ADOMD.NET processes, 463–464
business performance systems, 411
Analysis Services 2005 framework, 411–412
creating, 433–436
cube context, 146
datasource support, 463
functions, 436–437
Index

key performance indicators (KPIs) (continued)
metadata types, 432–433
properties, 434
rowset schema, 437–438
security risks, 437
UDM element, 242
uses, 432–433

KEY() function, drill-through queries, 415

keywords
CELL PROPERTIES, 37–38
FROM, 3–4
MDX queries, 3–4
NON EMPTY, 15–16
ON, 3
SELECT, 3–4
SESSION, 344
SQL (Structured Query Language) concerns, 4
THIS(), 398
WHERE, 3–4
WITH, 39–42

Kpi class, ADOMD.NET, 438–439

KPIs (key performance indicators)
ADOMD.NET processes, 463–464, 587
Analysis Services 2005 framework, 411–412
business performance systems, 411
creating, 433–436
cube context, 146
datasource support, 463
functions, 436–437
metadata types, 432–433
properties, 434
rowset schema, 437–438
security risks, 437
UDM element, 242
uses, 432–433

LANGUAGE() statement, subcube property value assignments, 402–404
last entered balance, calculation methods, 88–89
last pass wins rule, MDX Scripts, 373
.LastChild function, balance carryover calculations, 87–88, 588
LastChild() function, semi-additive measures, 390
LastNonEmpty() function
Analysis Services 2005, 84, 589
semi-additive measures, 390
LastPeriods() function
moving aggregate calculations, 79–81, 85–86, 590
target member time range selections, 81
.LastLead(), moving aggregate calculations, 79, 590
leaf-level calculations
avoiding, 485–487
optimization methods, 487–491
leaves, Analysis Services 2005, 382
Leaves() function
dimension leaves, 382, 590
leaf-level granularities, 125
unweighted allocations, 410
LEVEL_NUMBER property, Essbase, 31
levels
ADOMD Server object support, 290
CREATE CUBE statement, 505–508
CREATE GLOBAL CUBE statement, 526–527
dimension browsing method, 247–248
generation reference, 67
stored procedure permissions, 317–318
libraries, Analysis Services 2005 supported types, 283–285
LinkMember() function
member dimension mapping, 185, 591
role-playing dimensions, 264
local cubes. See also cubes
ASSL (Analysis Services Scripting Language), 528–530
commands, 512–513
CREATE CUBE statement, 502–514
CREATE GLOBAL CUBE statement, 524–528

.Lag(), moving aggregate calculations, 79, 85–86, 588

LANGUAGE property, currency formats, 343
language translation storage, UDM element, 242
creating from server cubes, 521–522
creation methods, 501–502
dimension definitions, 504–511
**INSERT INTO** statement, 514–518
levels, 505–508
measure definitions, 511–512
member formulas, 522–524
member properties, 508–510
named hierarchies, 505
properties, 521
ROLAP versus MOLAP, 513–514
rollup operators, 522–524
**SELECT** statement, 518–520

**LOOKUPCUBE**() function, MDX Script, 495, 594

**M**
many-to-many dimensions, MDX Scripts, 388–389
many-to-one relationships, dimension attributes, 244
Max() function
Analysis Services, 82–83, 595
collection looping, 114–115
semi-additive measures, 390
Max(), summary statistical operator, 52
MDX (MultiDimensional eXpressions)
arithmetic operators, 48
colon (:) character, 7–9
COM stored procedures functions, 312–314
comma (,) character, 7–9
comments, 16–17
curly braces { and } characters, 3
data model elements, 17–23
data-driven security, 303
DDL (Data Description Language), 323
described, 1–2
development history, 239
dimensions, 242–256
DML (Data Manipulation Language), 323
dot (.) characters, 3
Hyperion Solutions support, 441–442
invoking stored procedures, 319–320
metadata referencing functions, 64–65
non-case sensitive, 6
non-line oriented, 6
queries, 2–5
readability enhancements, 7
set operations, 473–480
solve order, 42–48
square bracket [ and ] characters, 3
statistical operators, 49–55
stored procedures, 285–288
supported APIs, 2
tuples, 17–19
UDM (Unified Dimensional Model), 240–242
XML for Analysis support, 441
MDX expressions. See also expressions
Analysis Services 2005 framework, 411–412
Quantitive KPIs, 411–412
MDX Scripts. See also calculated cells
aggregation assignments, 371–376
aggregation-related calculations, 497–498
attribute hierarchy, 491–492
avoiding slow, 495
**CALCULATE** statement, 366–368
calculated member assignments, 376–377
**CalculationCurrentPass()** function, 376
conditional assignments, 404–405
custom member formulas, 393–395
**<DefaultScript>** tag, 366
described, 366–367
**END SCOPE** statement, 395–397
**ERROR()** function, 402
expression assignments, 398–402
fact dimensions, 390
flow-type calculation optimization methods, 495–497
**FREEZE()** statement, 400–401
**IF** statement, 404–405
last pass wins rule, 373
leaf-level calculation, 485–487
leaf-level optimization methods, 487–491
many-to-many dimensions, 388–389
multiple attribute hierarchies, 379–386
named set assignments, 377–379
MDX Scripts (continued)
named set declaration placement, 378
NON_EMPTY_BEHAVIOR property, 491
nonadditive measures, 390–392
NonEmpty() function calculations, 490–491
parent/child attribute hierarchies, 387–388
pass order, 376
proportional allocations, 408–409
reference dimensions, 390
scope, 492–494
SCOPE statement, 395–397
scope calculations, 484–485
semi-additive measures, 390–392
semicolon (;) character requirement, 366
subcube cell property value assignments, 402–404
subcube definition rules, 369
subcube error value assignments, 402
subcube value overwriting, 368–371
subcubes, 368–371
THIS() function, 395–397
THIS() keyword, 398
Time Intelligence Wizard, 405–408
UDM element, 242
unary operators, 393–395
unweighted allocations, 409
user hierarchies, 386–387
versus calculated cells, 365
measure definitions, CREATE CUBE statement, 511–512
measure expression, leaf-level calculations, 487–488
measure groups
cube element, 256
data-mining relationships, 263
dimension relationships, 260–264
drill-through query returns, 414
granularity attributes, 382
IgnoreUnrelatedDimension property, 261–262
MeasureGroupMeasures() function, Analysis Services 2005, 525
MDX Scripts, 393–395
member properties
measure definitions, CREATE CUBE statement, 508–510
median calculation, 383
member formulas
local cubes, 522–524
MDX Scripts, 393–395
members.
See also calculated members
ADOMD Server object support, 290
data refreshing, 328
date calculations, 183–186
definition updates, 327–328
different things/different place returns, 220–225
dimension alterations, 324–325
dimension order, 175–176
dropping, 327
equivalence testing, 225
equivalence testing, 225
existence testing, 142
hierarchical level skipping sorts, 200–201
interdependence, 116–119
invalid location handling, 140–142
level testing, 222–225
most recent event returns, 212–216
moving within a dimension, 326
new member creation, 325–326
percent contribution calculations, 66–67
percentage contributions, 190–200
properties, 252
property queries, 30–32
reasons for disabling properties, 253
recursive calculated, 217–219
set alias requirements, 157–159
UDA/attribute selections, 276–280
Union() function, 181–182
unique names across a time dimension, 185
MembersWithData property, parent/child attribute hierarchies, 388
MemberValue() function
optimization methods, 483, 597
Return clause support, 415
metadata
ADOMD Server objects, 294–295
ADOMD.NET caching, 449
ADOMD.NET object model, 446–449
ADOMD.NET retrieval methods, 444–449
KPI definition maintenance, 412
KPIs, 432–433
OlapInfo class, 452–453
parent/children arrangements, 181–183
referencing functions, 64–65
RefreshMetadata method, 449
UDM element, 240
methods
Connection.CommitTrans, 330
CreateCommand, 450–451
Execute, 451
ExecuteCellSet, 451
ExecuteNonQuery, 451
ExecuteNonQuery, 451
ExecuteReader, 451, 462–463
ExecuteXMLReader, 451
GetSchemaDataSet, 445–446, 464–465
RefreshMetadata, 449
Microsoft.AnalysisServices
.AdomClient.dll reference,
ADOMD.NET, 443
Microsoft cube file connection,
ADOMD.NET, 444
Microsoft Excel
date calculations, 183
Product() function, 219
Microsoft Scorecard manager, KPI support, 432
Min() function
Analysis Services, 82–83, 597
semi-additive measures, 390
Min(), summary statistical operator, 53
MOLAP (multi-dimensional OLAP) cache
Analysis Services 2005, 240
CREATE CUBE statement, 513–514
monospace fonts, code readability enhancement, 7
MultiDimensional eXpressions (MDX)
arithmetic operators, 48
colon (:) character, 7–9
COM stored procedures functions, 312–314
comma (,) character, 7–9
comments, 16–17
curly braces { and } characters, 3
data model elements, 17–23
data-driven security, 303
DDL (Data Description Language), 323
described, 1–2
development history, 239
dimensions, 242–256
DML (Data Manipulation Language), 323
dot (.) characters, 3
Hyperion Solutions support, 441–442
invoking stored procedures, 319–320
metadata referencing functions, 64–65
non-case sensitive, 6
non-line oriented, 6
queries, 2–5
readability enhancements, 7
set operations, 473–480
solve order, 42–48
square bracket [ and ] characters, 3
statistical operators, 49–55
stored procedures, 285–288
supported APIs, 2
MultiDimensional eXpressions (MDX) (continued)
tuples, 17–19
UDM (Unified Dimensional Model), 240–242
XML for Analysis support, 441
multidimensional members, tuples, 17–19
multi-dimensional OLAP (MOLAP) cache
Analysis Services 2005, 240
CREATE CUBE statement, 513–514
multidimensional sorts, Analysis Services 2005, 205
multilevel hierarchies, dimension browsing method, 245
multiple dimensions
custom member formula interaction, 352
unary operator precedence, 352
multiplication, aggregations, 219–225

N
NAME property, Analysis Services, 31
name resolution, stored procedures, 318–319
Name() function, Return clause support, 415, 598
named hierarchies, CREATE CUBE statement, 505
named sets. See also sets
context, 149–150
CREATE SET command, 58–59
CREATE SET statement, 150
CURRENTCUBE command, 58
definition conventions, 57–60
DROP SET command, 58–59
Essbase session limits, 150
MDX Script declaration placement, 378
MDX Script value assignments, 377–379
scope, 58–60, 149–150
set aliases, 57
substitution variables, 59
uses, 150–152
WITH clause, 129
WITH SET statement, 150
names
axes framework, 5–6
capitalization issues, 6
nested dimensions, sorts, 203–207
.NET Assemblies, Analysis Services 2005 support, 286
.NET CLR (common language run-time) Analysis Services 2005 support, 283
stored procedure requirements, 286
.NET stored procedures. See also stored procedures
data types, 288
debugging, 299
MDX interaction, 286–288
parameters, 287–288
PartialSet(), 289–290
return values, 287–288
supported languages, 286
.NextMember function, period-to-period references, 75–76, 599
NextMember(), moving aggregate calculations, 79, 599
NON EMPTY
axes resolution, 110–111
empty slice removal, 15–16, 59
NON_EMPTY_BEHAVIOR property
axes resolution, 111
base measures, 343
NON_EMPTY_BEHAVIOR() statement, subcube property value assignments, 402
nonadditive measures, MDX Scripts, 390–392
None function, nonadditive measures, 390
NonEmpty() function
Analysis Services, 113–114
Analysis Services 2005, 73–74
cross-joined sets, 476
high-level calculations, 490–491
member events, 214
optimization methods, 478–479
NonEmptyCount() function, Essbase, 113–114, 600
NonEmptyCount(), summary statistical operator, 53
NonEmptyCrossJoin() function
  Analysis Services, 113–114, 600
  Analysis Services 2000, 74
cross-joined sets, 476
member events, 215
nonleaf members, parent/child attribute hierarchies, 388
NULL member
  Analysis Services, 18
division by zero, 69–70
NULL operator, Analysis Services, 137–139
NULL value, stored procedures, 300–302
numbers
  axes framework, 5–6
  COM stored procedure returns, 306–307
  ranking, 165–169
numeric values, formatting, 675–678
numerical codes, actions, 429–430

O
Object Linking and Embedding Data Base for Online Analytical Processing, 2
objects
  AdomdCommand, 442, 450–451
  AdomdConnection, 442
  Catalog, 442
  Cell, 455–457
  CellSet, 442, 452–457
  Member, 457–460
OLAP Mining Models, Analysis Services 2005 support, 263
OlapInfo class, metadata
  encapsulation, 452–453
OLE DB
  data type properties, 344
  IRowsetUpdate:Update() function, 330
rowset returns, 416
OLE DB for OLAP
  action definition, 411
cell property queries, 33
MDX supported API, 2
ON keyword, MDX queries, 3
onAxis() function, set returns, 290
OpeningPeriod() function, time/non-time calculations, 83, 601
operator reference, 542–635
operators. See also functions
  . Members, 9
  arithmetic, 48
  basic, 538–541
colon (:), 7–9, 140–142
  comma (,), 7–9
current cell referencing, 107
double pipe (||), 541
IN, 280–281
MISSING, 139–140
NULL, 137–140
rollup, 338–339
statistical, 49–55
string concatenation, 541
summary statistical, 49–55
unary, 338–339
value, 538–539
Weight, 338
Order() function
  axes resolution, 104–106, 601
  hierarchical sorts, 200–201
  member property calculations, 90–91
  named sets, 151–152
  nested dimension sorts, 203–207
  optimization methods, 480
  set sequencing, 28–30
  single set/multiple criteria sorts, 202
  sorts, 161–162
Ordinal() function, 180, 221
outline-style, code readability, 7

P
pages, query dimension specifications, 3
ParallelPeriod() function
  moving aggregate calculations, 79–80, 606
  same-period-last year references, 76
  sorts, 161
parameterized commands, ADOMD.NET, 451–452
parameters
  connection, 637–659
  .NET stored procedures, 287–288
parent/child attribute hierarchies, MDX
Scripts, 387–388
parent-child dimensions, INSERT INTO
statement, 515–516
parent-child hierarchy
Analysis Services 2005, 253–255
security application, 270–271
.Parent function
metadata referencing, 65
percent contribution calculations, 66–67
ParentSameAsPrev flag, member
information retrieval, 460
Pareto analysis, cumulative sums,
207–211
PartialSet(), .NET stored
procedure, 289–290
PartialSum() stored procedure, array
value passing, 307–311
partitions, drill-through operations, 415
pass order, Analysis Services 2005
issues, 376
percent contributions, calculation
functions, 65–70
percentage contributions, report-based
totals-to-parent, 189–200
percentages, percent contribution
calculations, 65–70
PeriodsToDate() function, year-to-
date calculations, 77–78, 608
period-to-date aggregations,
calculations, 76–79
period-to-period references,
calculations, 75–76
Permission property, stored
procedures, 317
permissions
data-driven security, 303
stored procedures, 317–318
perspectives, cube element, 265
PivotTable Services (PTS), AS2000
versus AS2005, 472
placeholders, INSERT INTO statement,
517
plus (+) operator, 541
POST flag, Hierarchize() function,
181
precedence order, calculated members,
42–48
.PrevMember function, period-to-
period references, 75–76, 609
PrevMember() function, moving
aggregate calculations, 79, 609
Proactive caching, Analysis Services
2005, 240
Product() function, multiplication
aggregations, 219
Properties() function, sorts, 161, 609
properties
actions, 430–432
ADOMD Server object support, 290
AllowPartialTrustedCallers, 297
Analysis Services, 31–32
BACK_COLOR, 351
cell, 143, 455–456, 668–673
cell data values, 98
cell precedence calculations, 143–146
cell queries, 32–33
cell retrieval, 455–456
Context object, 294
DataSource, 521
DrillThroughFilter, 413
DrillThroughForm, 413
DrillThroughJoin, 413
Essbase, 31
FORE_COLOR, 351
FORMAT_STRING, 343
IgnoreUnrelatedDimension,
261–262
Impersonation, 317–318
InsertInto, 521
KPIs, 434
LANGUAGE, 343
local cube, 521
member, 252, 508–510, 662–668
Member object, 457
member calculations, 89–92
MembersWithData, 388
NON_EMPTY_BEHAVIOR, 111, 343, 491
OLE DB data types, 344
Permission, 317
reasons for disabling, 253
ReturnCellProperties, 467–468
SOLVE_ORDER, 343, 347
Source_DSN, 521
Source_DSN_Suffix, 521
UnaryOperatorColumn, 338
UseExistingFile, 521

property values, subcube value assignments, 402–404
proportional allocations calculations, 70–71
MDX Scripts, 408–409

PROPRIETARY actions, client execution, 423

PTS (PivotTable Services), AS2000 versus AS2005, 472

Q
quantities, proportional allocations, 70, 408–409
Quantitive KPIs, MDX expression management, 411–412
queries
attribute retrieval, 274–275
autoexist behavior, 250
axes evaluation stage, 103–106
axes reference, 3
axis name/numbering framework, 5–6
axis-only, 22
cell display formatting precedence, 143–144
cell evaluation, 107–111
cell properties, 32–33
cell selection, 2
CellSet object, 442
colon (:) operator results display, 9
comma (,) character separator, 3
context element execution, 101–102
context looping, 114–116
curly braces { and } characters, 3
current cell referencing, 107
".CurrentMember function looping, 114–116
data grids, 2
data mining example, 229–237
".DefaultMember function, 100–101
Descendants() function, 11–14
dimensions, 249–251
division by zero errors, 136
dot (.) characters, 3
drill-through, 412–418
empty cell handling, 136–138
empty slice removal, 14–16
exchange rate retrieval, 257
execution stages, 99–107
HAVING clause resolution, 111–114
IF statement versus IIF() function performance, 405
invalid calculation errors, 136
invalid location handling, 140–142
iterative subcubes, 127–128
keywords, 3–4
MDX data model element, 21–22
member interdependence, 116–119
member properties, 30–32, 252
".Members operator results display, 9
multidimensional results, 416
named set incorporation, 57
named set uses, 150–152
NON Empty keyword, 15–16
non empty axes resolution, 110–111
NULL operator handling, 137–140
numerical errors, 136
product category restrictions, 259
ranking numbers, 165–169
ratio-to-ancestor results, 69
recursive evaluation, 108–110
reference dimension relationship, 262–263
results display, 4
set alias requirements, 157–159
single-cell with default slicer, 101
single-cell with nondefault slicer, 102
slicer context override, 106–107
solve order rules, 109–110
tuple-based subcube restrictions, 126
tuples on columns, 18–19
two cells, values and tuples, 103
UDA retrieval, 274–275
WHERE clause execution, 102
WITH keyword, 39–42
queries (continued)
zero axes, 22
zero-dimensional, 101–102
query scope, calculated members, 39
quote (‘) character, Analysis Services
2005 support, 41

R
range size, calculations, 93
Rank() function
current tuple range return, 208
ranking numbers, 165–169
tie numbering, 225–226
ratios
calculated member definitions, 187–190
percent contribution calculations, 65–70
proportional allocations, 70–71
RDBMS connections, action statements,
423–424
real-time data access, UDM element, 240
recordsets, drill-through data retrieval,
462–463
recursion, infinite, 131–132
reference dimensions, MDX Scripts, 390
REFRESH CUBE statement, cell data
refreshing, 328
RefreshMetadata method,
ADOMD.NET metadata caching, 449
RELATIONAL_DESCENDANTS property,
Essbase, 31
relationships
attribute-relationship model, 244–247
data-mining, 263
dimension attributes, 244–247
dimension element, 249
dimension hierarchies, 247–248
dimensions, 260–264
hierarchical sorts, 200–201
many-to-many, 263
many-to-many dimensions, 388–389
many-to-one, 244
metadata referencing functions, 64–65
natural versus unnatural hierarchies,
247–248
one-to-one, 244
parent/child attribute hierarchies,
387–388
parent-child hierarchy, 253–255
reference dimension, 262–263
report models, UDM element, 242
reports, percentage contributions,
190–200
results, display query, 4
Return statement, drill-through
queries, 414–415
return values, .NET stored procedures,
287–288
ReturnCellProperties property,
flattened result sets, 467–468
rich analytics, UDM element, 242
rich metadata, UDM element, 240
ROLAP, CREATE CUBE statement,
513–514
role-playing dimensions, uses, 264
Roles editor
cell security application, 270
dimension data restriction expressions,
267–268
rolling averages, moving aggregate
calculations, 79–81
rollup by unary operator, calculation
mechanism, 338–339
rollup operators
INSERT INTO statement, 517
local cubes, 522–524
RollupChildren() function, unary
operator calculations, 338, 613
root, dimension definition, 382
Root() function
dimension root, 382, 613
proportional allocations, 408–409
rows
calculated member definitions, 187–190
empty slice removal, 15
non empty resolution, 110–111
query dimension specifications, 3
rowsets
drill-through returns, 415–417
schema rowset retrieval, 445–446
SELECT statement, 520
S
Safe permission, stored procedures, 317
sales, results display query, 4
same-period-last year references, calculations, 76
schema, rowset retrieval, 445–446
schemas, cube element, 256
SCOPE statement, subcube definitions, 395–397, 615
Scope function, versus IIF() statement, 492–494
scope
action targets, 429
calculated members, 39–48
MDX Script calculations, 484–485
named sets, 58–60, 149–150
versus IIF() statement, 492–494
scripts. See MDX Scripts
security
AASL (Analysis Services Scripting Language), 529–530
Analysis Services 2005, 267–271
cell application, 270
COM stored procedure issues, 305–306
commandline actions, 425
data-driven, 303
dimension security verification, 268–270
KPIs, 437
parent-child hierarchy, 270–271
stored procedure permission levels, 317–318
stored procedures, 303–305
Username() function, 270
SELECT keyword, 3–4
SELECT statement
Analysis Services 2005, 128–131
local cubes, 518–520
selections, Top-N, 162–171
SELF flag, Descendants() function, 12
SELF_AND_AFTER flag,
    Descendants() function, 14
SELF_AND_BEFORE flag,
    Descendants() function, 12–13
SELF_BEFORE_AFTER flag,
    Descendants() function, 14
semi-additive measures
aggregation functions, 257–259
MDX Scripts, 390–392
Time dimension, 255–256
semicolon (;) character, MDX Scripts
    requirement, 366
server cubes, local cube creation, 521–522
servers
CREATE MEMBER command, 44–47
named set substitution variables, 59
set operation optimization method, 473–480
SESSION keyword, OLE DB session
    validation, 344
session queries
    Analysis Services 2005 solve order, 132–134
calculation definitions, 146–148
session scope, calculated members, 39
sessions, default member alterations, 324–325
Set, ADOMD Server objects, 290
set aliases. See also sets
current member requirements, 157–159
defining, 153–154
named sets, 57
naming conventions, 155
NonEmpty() function, 214
uses, 153–156
set operations, performance
    optimization methods, 473–480
SetBuilder class, ADOMD Server objects, 292
sets. See also named sets; set aliases
ADOMD Server object support, 290
backward/forward time sums, 216–219
BottomCount() function, 477
constructors, 7–9, 540–541
CrossJoin() function, 23–25
cross-joined, 474–477
database ordering considerations, 10
described, 7
Filter() function, 25–27
invalid location handling, 140–142
Order() function, 28–30
percentage-of-total contribution
    calculations, 191–196
power of tuple references, 27
reversing, 176–177
single set/multiple criteria sorts, 202
sets (continued)
subset concatenation, 9
TopCount() *m function, 477
tuple operation conversion, 182–183
SetToArray() function, array value passing, 307–311, 615
SetToStr() function, COM stored procedure support, 312, 615
share-of-parent, ratio calculations, 67
share-to-parent, calculation methods, 93–94
slash (/) symbol, comment style, 16
slice members, CREATE GLOBAL CUBE statement, 527
slicers
context override, 106–107
query execution element, 101–102
query resolution order, 98
snowflake schema, dimensions, 242–243
solve order (formula precedence)
calculated members, 42–48, 99
formula determination, 358–360
SOLVE_ORDER property, cell calculations, 343, 347
sorts
CoalesceEmpty() function, 165
hierarchical, 200–201
multidimensional, 205
multiple layers/dimensions, 202–207
nested dimensions, 203–207
Order() function optimization, 480
single set/multiple criteria, 202
Source_DSN property, local cubes, 521
Source_DSN_Suffix property, local cubes, 521
SQL (Structured Query Language),
MDX keyword concerns, 4
square bracket [ and ] characters, query element names, 3
star schema, dimensions, 242–243
statements
ALTER CUBE, 324–325
ALTER CUBE CREATE DIMENSION MEMBER, 325
ALTER CUBE DROP MEMBER, 327
ALTER CUBE MOVE DIMENSION MEMBER, 326
ALTER CUBE UPDATE DIMENSION MEMBER, 327
ASSL (Analysis Services Scripting Language), 528–529
BACK_COLOR(), 402
CALCULATE, 366–368
Call, 296
CELL_PROPERTIES, 467–468
CREATE CELL CALCULATION, 346–350
CREATE CUBE, 502–514
CREATE GLOBAL CUBE, 524–528
CREATE MEMBER, 341, 342–345
CREATE SET, 150
CREATE SUBCUBE, 119–128
DIMENSION PROPERTIES, 274–275
DRILLTHROUGH, 417–418, 462
DROP CELL CALCULATION, 350–351
DROP MEMBER, 345
DROP SUBCUBE statement, 119, 128
END SCOPE, 395–397
FONT_FLAGS(), 402
FONT_NAME(), 402
FONT_SIZE(), 402
FORE_COLOR(), 402
FORMAT_STRING(), 402
FREEZE(), 400–401
IF, 404–405
IIF(), 492–494
INSERT INTO, 514–518
LANGUAGE(), 402–404
NON_EMPTY_BEHAVIOR(), 402
REFRESH CUBE, 328
Return, 414–415
SCOPE, 395–397
SELECT, 128–131, 518–520
UPDATE CUBE, 323, 330–334
USE LIBRARY, 316
WITH CELL CALCULATION, 346
WITH MEMBER, 344–345
WITH SET, 150
statistical operators, MDX supported types, 49–55
Stddev(), summary statistical operator, 54, 617
StddevP(), summary statistical operator, 54, 617
Stddev(), summary statistical operator, 54, 617
Stddevp(), summary statistical operator, 54, 617
stored procedures. See also .NET stored procedures
ActiveX Automation requirements, 286
ADOMD Server objects, 289–295
AMO.NET management, 295–297
Analysis Services 2005 supported libraries, 283–285
assembly collections, 316
Call statement, 296, 320
calling, 318–319
COM DLL, 286, 305–306
data-driven security, 303
debugging .NET stored procedures, 299
dynamic security uses, 303–305
exception errors during execution, 301–302
invoking, 319–320
loading methods, 316–318
MDX interaction, 285–288
name resolution, 318–319
.NET CLR assembly requirements, 286
NULL procedure as output parameter, 301
NULL value as input parameter, 300–301
PartialSet(), 289–290
PartialSum(), 307–311
permission levels, 317–318
server side execution, 316
static versus nonstatic functions, 297–306
time span until sum example, 315–316
USE LIBRARY statement, 316
uses, 316–320
Storeproc() function, 495
string codes, formatting, 675–684
string concatenation, operators, 541
string values, formatting, 682–684
strings, COM stored procedure returns, 306–307
strong hierarchies, Analysis Services 2005, 116–117
STRTO MEMBER() function, 495
StrToSet() function, COM stored procedure support, 313–314, 616
StrToTuple() function, 619
COM stored procedure support, 313–314
MDX Script, 495
StrToValue() function, Analysis Services, 222, 619
Structured Query Language (SQL), MDX keyword concerns, 4
subcubes
attribute relations, 123–125
cell property value assignments, 402–404
creating in Analysis Services 2005, 119–128
data values, 127
END SCOPE statement, 395–397
error value assignments, 402
FREEZE() statement, 400–401
iterative queries, 127–128
MDX Scripts, 368–371
query-specific uses, 125
report-based totals-to-parent, 199–200
restrictions, 123–125
SCOPE statements, 395–397
session-specific uses, 125
THIS() function, 395–397
tuple specifications, 125–126
tuple-based restrictions, 126
subsets, concatenation, 9
substitution variables, Essbase support, 59
subtrees, Union() function, 181–182
Sum() function
Analysis Services, 82–83
context looping, 114–115
cross-joined sets, 474–475
year-to-date aggregation calculations, 76–78
Sum(), summary statistical operator, 52, 620
summation operations, optimization methods, 480–482
sums, backward/forward time calculations, 216–219
T

tables, drill-through client access, 412–418

tabular results, AdomdDataReader class, 466–470
tag
  <DefaultScript>, 366
  MDX Scripts, 366–367
Tail() function
  balance carryover calculations, 85, 620
  member events, 213
  uses, 180, 214
target members, time range selections, 81

target scopes, actions, 429

targets
  actions, 424–425
  column placeholders, 517
TCP/IP, ADOMD.NET connections, 444
THIS function, subcube references, 395–397
THIS keyword, MDX Scripts, 398, 620
time dimensions
  Analysis Services 2005, 255–256
  calculations, 82–83
  role-playing dimensions, 264
Time Intelligence Wizard
  Analysis Services 2005, 408
  MDX Scripts, 405–408
time intelligence, Analysis Services 2005, 227
time ranges, target member selections, 81
time-based references, calculation methods, 74–81
times
  backward/forward sums, 216–219
  dimension analysis, 227–228
time-series, calculation methods, 74–81
TopCount() function
  optimization methods, 477, 621
  sorting/ranking tuples, 162–165
  top-selling product returns, 211–212
  Top-N selections, 162–171
TopPct() function, set operations, 477, 622
TopPercent() function, percent retrieval, 174, 622
TopSum() function, 623
  sum returns, 217
  tuple thresholds, 172–173
ToSet() function, set construction, 292
ToTuple() function, tuple construction, 291
tuple aliases, Essbase, 149
TupleBuilder class, ADOMD Server objects, 291
tuples
  ADOMD Server object support, 290
  axis 0 result rowset, 24, 467
  constructing, 540, 624
  dimension order, 175–176
  invalid location handling, 140–142
  MDX data model element, 17–23
  member information retrieval, 460
  named set caching, 150
  non-axis 0 result rowsets, 468–470
  percent retrieval, 174–175
  root dimension, 382
  set operation conversion, 182–183
  sort functions, 161–162
  subcube specifications, 125–126
  thresholds, 172–173
  tied rank set inclusion, 225–226
  TopCount() function, 162–165
TupleToStr() function, COM stored procedure support, 312, 625
TYPED flag, Analysis Services 2005, 184

U

UDA() function, member selections, 279–280, 625

UDAs (user-defined attributes)
  base dimension member selections, 276–280
  calculation uses, 275–276
  IsUDA() function, 276
  retrieval query, 274–275
  versus attributes, 273–274

UDFs (user-defined functions), Analysis Services 2000, 283

UDM (Unified Dimensional Model), elements, 240–242
unary operators
  calculation method, 338–339
MDX Scripts, 393–395
  multiple dimension precedence, 352
  pass order, 376
UnaryOperator() function, Return clause support, 415, 625
UnaryOperatorColumn property, unary operator definitions, 338
Union() function
  hierarchical order, 181–182, 626
  member selections, 279
UniqueName() function, Return clause support, 415, 626
UnOrder() function, optimization methods, 480, 627
Unrestricted permission, stored procedures, 317
unweighted allocations calculations, 71
MDX Scripts, 409
UPDATE CUBE statement
  data cell updates, 323
  data updates, 330–334
  updates
    member definitions, 327–328
  UPDATE CUBE statement, 323
URL action, uses, 420
USE LIBRARY statement, stored procedures, 316
UseExistingFile property, local cubes, 521
user hierarchies, MDX Scripts, 386–387
user profiles, Username() function, 270
user-defined attributes (UDAs)
  base dimension member selections, 276–280
  calculation uses, 275–276
  IsUDA() function, 276
  retrieval query, 274–275
  versus attributes, 273–274
user-defined functions (UDFs), Analysis Services 2000, 283
Username() function, user profile security, 270, 628
V
  VAL() function, MDX Script, 495, 628
  ValidMeasure() function, 261, 629
  value operators, 538–539
  Var(), summary statistical operator, 54–55, 629
  variables, substitution, 59
  Variance(), summary statistical operator, 54–55
  VarP(), summary statistical operator, 55, 629
  VISIBLE flag, calculated members, 343
Visual Basic for Applications (VBA)
  date calculations, 183
Visual Studio 2005
  debugging .NET stored procedures, 299
  viewing/editing MDX Scripts, 366–367
Visual Studio.NET, ADOMD.NET reference, 443
VisualTotals() function, report-based totals-to-parent, 197–199, 629
W
  Web servers, commandline action security, 425
  Weight rollup operator, Analysis Services 2005, 338
  weighted averages, 73–74
  WHERE clause, query execution stage, 101–102
  WHERE keyword, MDX queries, 3–4
  whitespace
    code readability, 7
    comment placement, 17
  WITH clause, named sets, 129
  WITH keyword, 39–42
  WITH CELL CALCULATION statement, 346
  WITH MEMBER section, 39–43
  statement, 344–345
  WITH SET command, 57–58
  statement, 150
  WithAttr() function, 278–279, 630
  wizards
    Add Business Intelligence, 405
    Define Time Intelligence, 227
wizards (continued)
   Dimension, 245
   Time Intelligence, 405–408
writeback operations, 325–328
writebacks, cube data, 329–334
wrong-level reference, 94–95

X
XML for Analysis (XMLA)
   Analysis Services 2005 client architecture, 472–473
cell property queries, 33
MDX supported API, 2, 441
XMLA (XML for Analysis)
   Analysis Services 2005 client architecture, 472–473
   cell property queries, 33
   MDX supported API, 2, 441
   XMLA connection, ADOMD.NET, 444

Y
year-to-date aggregations, calculations, 76–79
YTD() function, ranking numbers, 167–168, 635

Z
zero axes, queries, 22
zero numbers, query error handling, 136
zero values
   calculation handling, 69–70
division by calculations, 95
zero-dimensional queries, execution stages, 101–102